UNITED STATES DEPARTMENT OF COMMERCE
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
09/469,652	12/22/99	WIERER	J 10992873-1

024251 MM91/1003
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EXAMINER	
CHU, C	
ART UNIT	PAPER NUMBER
2815	

DATE MAILED: 10/03/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trad marks

Office Action Summary	Application No.	Applicant(s)	
	09/469,652	WIERER ET AL.	
	Examiner	Art Unit	
	Chris C. Chu	2815	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 June 2001* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 - 18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 - 18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *06 July 2001* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *8* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Response to Amendment

1. Applicant's amendment filed on June 28, 2001 has been received and entered in the case.

Drawings

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description: reference character hυ in Figures 1, 3, 5, and 6, and reference character 21 in Figure 3 are not described in the specification.

Correction is required.

3. Applicant is required to submit a proposed drawing correction in reply to this Office action. However, formal correction of the noted defect can be deferred until the application is allowed by the examiner.

Specification

4. The disclosure is objected to because of the following informalities: on page 6, line 11, "(linear I-V)" is missing some simple description about I and V, and their relationship to each other.

Appropriate correction is required.

Claim Objections

5. Claim 1 is objected to because of the following informalities: remove "to" in line 1. Appropriate correction is required.

6. Claim 18 is objected to because of the following informalities: need "," after Ti in line 2. Appropriate correction is required.

Claim Rejections - 35 USC § 102

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 1, 4, 7, 8, 11, 14, and 17 are rejected under 35 U.S.C. 102(b) as being anticipated by Schetzina.

Fig. 27 of Schetzina shows a "light emitting device" (120) comprising a "heterostructure" (11) of semiconductor materials having at least one p-type layer (17) and one n-type layer (16), and the p-type layer (17) and the n-type layer (16) have p and n contacts. The p contact is electrically connected to the p-type layer and the n contact is electrically connected to the n-type layer, wherein one of the p and n contacts is a multi-layer contact having at least one ohmic layer (102 for n-type contact layer and 19 for p-type contact layer) and one reflector layer (13 and column 21, lines 14 - 19).

Regarding claims 4 and 14, Schetzina discloses the multi-layer contact has a barrier layer (18 in Fig. 27) interposing the ohmic contact layer and the reflector layer.

Regarding claims 7 and 17, Schetzina discloses the reflector layer is selected from a group that includes Al, Cu, Rh, Pd, and Au (column 18, lines 48 – 50).

Regarding claim 8, in Fig. 27, reference character (102) and reference character (19) clearly show that the p and n contacts are on opposing faces of the heterostructure.

Regarding claim 11, Fig. 27 of Schetzina shows a "light emitting device" (120) comprising a "GaN-based heterostructure" (11 and column 22, lines 26 – 30 (Group III-V materials includes Ga and blue light is indicating N)) of semiconductor materials having at least one p-type layer (17) and one n-type layer (16), and a p and n contacts. The p contact electrically connected to the p-type layer, the n contact is electrically connected to the n-type layer, wherein one of the p and n contacts is a multi-layer contact having at least one ohmic layer (102 for n-type contact layer and 19 for p-type contact layer) and one reflector layer (13 and column 21, lines 14 - 19).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. Claims 2 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schetzina in view of Tischler.

Schetzina discloses the claimed invention except the reflectivity of the multi-layer contact of the light-emitting device, which is greater than 75 %. However, Tischler discloses the reflectivity of the multi-layer contact having a "peak reflectivity [] measured to be 80% at 442nm" (column 11, lines 47 – 52). Thus, it would have been obvious to one of ordinary skill in the art at the time when the invention was made to modify Schetzina by increasing the reflectivity of the multi-layer contact to be greater than 75 %. The ordinary artisan would have been motivated to modify Schetzina in the manner described above for at least the purpose of increasing a light output and light extraction efficiency (column 10, lines 46 – 61 and column 4, lines 49 - 54).

10. Claims 3 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schetzina in view of Sugiura et al.

Schetzina discloses the claimed invention except the contact resistance of the multi-layer contact of the light-emitting device, which is less than 0.01 Ω-cm^2. However, Sugiura et al. discloses contact resistance of the multi-layer contact having "about 0.1 Ωcm^2 is reduced to 0.001 Ωcm^2" (column 5, lines 27 – 32). Thus, it would have been obvious to one of ordinary skill in the art at the time when the invention was made to modify Schetzina by decreasing the contact resistance of the multi-layer contact to be less than 0.01 Ω-cm^2 as taught by Sugiura et al. The ordinary artisan would have been motivated to modify Schetzina in the manner described above for at least the purpose of improving performance of the light-emitting device by decreasing the contact resistance in the multi-layer contact.

11. Claims 5, 10, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schetzina in view of Nakagawa et al.

Regarding claims 5 and 15, Schetzina discloses the claimed invention except the thickness of the reflector layer, which is greater than 500 angstroms. However, Nakagawa et al. discloses the thickness of the reflector layer to be "(Ti/Pd/Ag (400nm/200nm/1μm thick))" (column 19, lines 45 – 48). Thus, it would have been obvious to one of ordinary skill in the art at the time when the invention was made to modify Schetzina by increasing the thickness of the reflector layer to be greater than 500 angstroms. The ordinary artisan would have been motivated to further modify Schetzina in the manner described above for at least the purpose of increasing the reflection and to have a high quality semiconductor layer (column 19, line 57 – 59).

Regarding claim 10, a difference between Schetzina and the claimed invention is that the reflector layer is Ag. However, Nakagawa et al. discloses the reflector layer using a "silver after being burned also function as a back-surface electrode and a back-surface reflection layer" (column 14, lines 1 – 2). Thus, it would have been obvious to one of ordinary skill in the art at the time when the invention was made to modify Schetzina by using Ag for the reflector layer as taught by Nakagawa et al. The ordinary artisan would have been motivated to modify Schetzina in the manner described above for at least the purpose of reducing the reflection loss of an incident light (column 14, lines 11 – 12).

12. Claims 6 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schetzina in view of Liu et al.

Schetzina discloses all of the claimed invention except the thickness of the ohmic contact layer, which is less than 200 angstroms. However, Liu et al. discloses the thickness of the ohmic

contact layer, which is less than 200 angstroms (column 4, lines 60 – 63). Thus, it would have been obvious to one of ordinary skill in the art at the time when the invention was made to modify Schetzina by adding less than 200 angstroms for the thickness of the ohmic contact layer as taught by Liu et al. The ordinary artisan would have been motivated to modify Schetzina in the manner described above for at least the purpose of improving the transistor performances (column 2, lines 43 ~ 46).

13. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schetzina in view of Yoshida et al.

Schetzina discloses the claimed invention except the ohmic contact layer includes Ni and Ag. However, Yoshida et al. discloses the ohmic contact layer including Ni and Ag (column 15, lines 1 – 11). Therefore, it would have been obvious to one of ordinary skill in the art at the time when the invention was made to further modify Schetzina by including Ni and Ag for the ohmic contact layer as taught by Yoshida et al. The ordinary artisan would have been motivated to further modify Schetzina in the manner described above for at least the purpose of reducing "the contact resistance by about 10% between the contact layer" (column 15, lines 9 – 11).

14. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schetzina in view of Okazaki.

Schetzina discloses the claimed invention except the ohmic contact layer, which is selected from a group that consist of Ti, Au/NiO, and Ni/Au. However, Okazaki discloses that the material of the ohmic contact layer (13) is selected from a group of "titanium (Ti), nickel

(Ni), etc." (column 8, lines 9 – 14 and column 8, lines 32 – 37). Therefore, it would have been obvious to one of ordinary skill in the art at the time when the invention was made to modify Schetzina by selecting from a group that consist of Ti, Au/NiO, and Ni/Au for the ohmic contact layer as taught by Okazaki. The ordinary artisan would have been motivated to modify Schetzina in the manner described above for at least the purpose of decreasing the ohmic contact resistance between the layers and increasing the reflectivity of the ohmic contact layer.

Response to Arguments

15. Applicant's arguments filed on June 28, 2001 have been fully considered but they are not persuasive.

In Applicant's arguments for the reference character hυ in Figures 1, 3, 5, and 6, and the reference character "21" in Fig. 3, the applicant's argued that since reference characters "11" and "21" are pointing same part of the structure, so the reference character "21" refers to a semiconductor. However, the argument is not persuasive, because the mere fact is the reference character hυ and the reference character "21" are not disclosed in the specification of instant invention.

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., the ohmic contact is made of metallic layers.) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

In response to applicant's argument that Schetzina fail to show a barrier layer. See, column 11, line 20 ~ column 12, line 45, where Schetzina discloses barrier layer (18).

In response to applicant's argument that Schetzina fails to disclose the use of every member of the group; Cu, Rh and Pd. Claims 7 and 17 are expressed as a Markush group. Reference discloses Au and Al in column 18, lines 48 ~ 50. Therefore, reference Schetzina discloses more than one element in the Markush group.

In response to applicant's argument for claim 11, Schetzina does in fact use GaN. As pointed out in the first office action, Schetzina in column 22, lines 26 – 34 discloses use of Group III – V material, and in line 34 specifically mentions blue, where N is a well known Group III – V material which produces blue light. Therefore, it is readily apparent to the ordinary artisan that GaN is encompassed by the disclosure of Schetzina, since GaN is a well known Group III – V material which produces blue light. Further, the recitation "the reflecting layer is part of the ohmic contact" are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

For the reasons provided above, the ***35 USC § 102(b)*** rejection is proper.

In response to applicant's argument for claims 2 and 12, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Further, the argument that "the Bragg Mirror is not a multi-layer contact" is not support by the disclosure of Tischler. In column 10, lines 48 –

49, Tischler specifically disclosed Bragg mirror as being a sequential layers of metallonitride materials (read column 10, lines 45 ~ 61).

In response to applicant's argument for claims 3 and 13, applicant's arguments are not persuasive for the same reasons provided in above paragraph (see response for claims 2 and 12). See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). Further, Sugiura et al. discloses a multi-layer contact (see Fig. 3).

In response to applicant's argument for claims 5, 10, and 15, as explains above (see response for claims 2 and 12), one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992).

In response to applicant's argument for claim 18, claim 18 only requires element Ti, element Au/NiO, or element Ni/Au. Okazaki discloses titanium (Ti) (column 8, lines 9 – 14).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chris C. Chu whose telephone number is (703) 305-6194. The examiner can normally be reached on M-F (10:30 - 7:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie C. Lee can be reached on (703) 308-1690. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7382 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Chris C. Chu
Examiner
Art Unit 2815

c.c.
September 27, 2001

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